
Transient Brightenings Associated with Flux Cancellation Along a Filament Channel

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Abstract

Filament channels coincide with large-scale polarity inversion lines of the photospheric magnetic field, where flux cancellation continually takes place. High-cadence Solar Dynamics Observatory (SDO) images recorded in He II 30.4 nm and Fe IX 17.1 nm in August 2010 reveal numerous transient brightenings occurring along the edge of a filament channel within a decaying active region, where SDO line-of-sight magnetograms show strong opposite-polarity flux in close contact. The brightenings are elongated along the direction of the filament channel, with linear extents of several arcseconds, and typically last a few minutes; they sometimes have the form of multiple two-sided ejections with speeds on the order of 100 km/s. Remarkably, some of the brightenings rapidly develop into larger scale events, forming sheetlike structures that are eventually torn apart by the diverging flows in the filament channel and ejected in opposite directions. We interpret the brightenings as resulting from reconnections among filament-channel field lines having one footpoint located in the region of canceling flux. In some cases, the flow patterns that develop in the channel may bring successive horizontal loops together and cause a cascade to larger scales.

Keywords: filaments, activity, chromosphere, magnetic topology, surface magnetism, SDO, magnetic flux cancellation

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